MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 2, 2019/2020

TCS2221 – COMPUTER GRAPHICS

(All Sections/Groups)

9 MARCH 2020
9.00 a.m. – 11.00 a.m.
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This question paper consists of 3 pages (including cover page) with 4 structured questions.
2. Answer ALL questions. The distribution of the marks for each question is given.
3. Please write all your answers in the answer booklet provided.

QUESTION 1

(a) Based on the given OpenGL code, answer the following question.

```
#include <GL\glut.h>
void display()
{
   glClear
(GL_COLOR_BUFFER_BIT);
   glColor3f(1.0, 0.0, 0.0);
     glBegin (GL_POLYGON);
//(i) define the vertex
     glEnd ();
    glFlush ();
}
```

```
void init()
{
  //(ii) & (iii)
//define the background color
glMatrixMode(GL_PROJECTION);
glLoadIdentity();
gluOrtho2D(-1.0, 1.0, -1.0, 1.0);
 }
```

```
int main(int argc, char** argv)
{
  glutInit (&argc, argv);
  //(iv) Name the window
  glClearColor(1.0, 1.0, 1.0, 0.0);
  glutDisplayFunc (display);
  glutMainLoop ();
  return 0;
}
```

(i) Define the vertices of a hexagon in 2 dimensions with the starting point (-0.5,-0.5). [3 marks]

(ii) Describe each parameter that is needed to set the background color. [1 mark]

(iii) Set the background color as blue. [1 mark]

(iv) Write the code that name the window as "Hexagon". [1 mark]

(b) Assume that you have a starting coordinate (5,8). Define the coordinate of the following points on a circle with radius 8.

(i) Angle = 51 degree where $\sin(51^\circ) = 0.7771$ and $\cos(51^\circ) = 0.6293$ [2 marks]

(ii) Angle = 315 degree where $\sin(315^\circ) = -0.7071$ and $\cos(315^\circ) = 0.7071$. [2 marks]

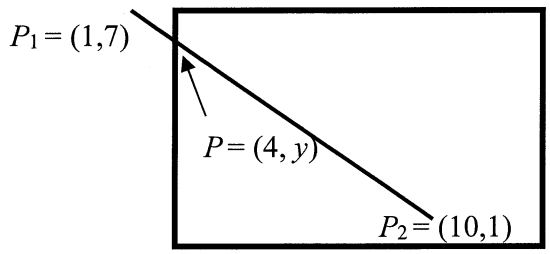
Continued.....

QUESTION 2

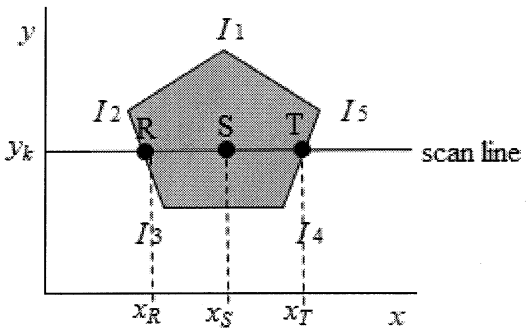
(a) Briefly describe the purpose of applying Cohen-Sutherland Algorithm. [2 marks]

(b) Based on the following figure, define the intersection y coordinate of point P after clipping.

[3 marks]



(c) Given the figure below. Illustrate the equation to obtain the intensity value at point S when Gouraud Shading is applied. [5 marks]



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QUESTION 3

The following transformation is applied on a 2D object:

- Translate to coordinate (4,5).
- Scale by 3 times along x-axis and 5 times along y-axis.
- Rotate at 50 degrees anti-clockwise about z -axis.

(a) Show the matrices of the translate, scale and rotate transformation by using homogeneous form. [3 marks]

(b) Define the composite matrix ($\mathbf{C_m}$) of the transformation. [4 marks]

(c) Provide the new coordinate when the transformation is applied on a point P(1,6). [2 marks]

(d) Use the newly obtained coordinate in (c) and reflect it over the x-axis. [1 mark]

QUESTION 4

(a) Why an object is called a platonic solid? Explain with examples. [2 marks]

(b) Assume that a camera is located at (3,3,3) and looked at the center of origin of the world coordinate. Compute uvn-viewing coordinate reference frame. [6 marks]

(c) Compare between parallel projections and perspective projections. [2 marks]

End of Paper